

Modification of silver/silver sulfide nanoparticle on carbon nanotube electrode for simultaneous detection of ascorbic acid and dopamine

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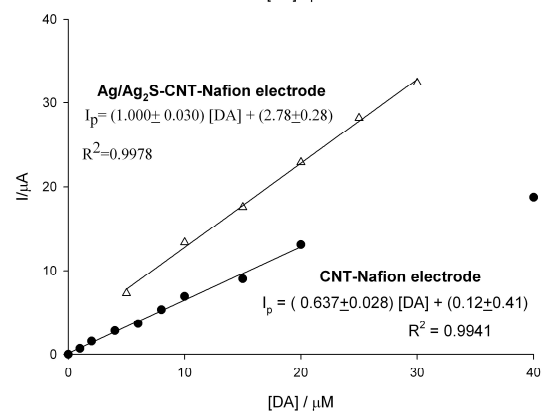
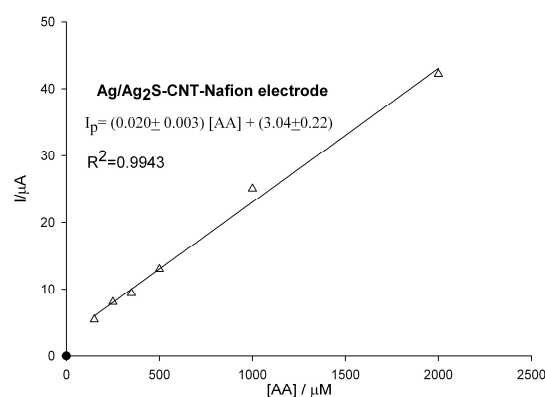
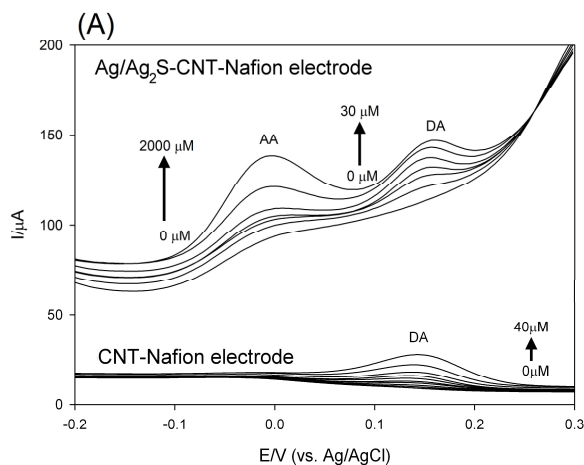
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### Abstract

In this study, silver/silver sulfide ( $\text{Ag}/\text{Ag}_2\text{S}$ ) was applied on an electrochemical system for ascorbic acid (AA) and dopamine (DA) sensor in phosphate buffered solution (pH 7.0). The  $\text{Ag}/\text{Ag}_2\text{S}$  nanoparticle and carbon nanotube (CNT) were dispersed an ITO electrode in Nafion. The electrochemical behaviors of AA and DA were examined by differential pulse voltammetry (DPV) technique. The characteristic peak of AA and DA in DPV votammogram were well-separated on the  $\text{Ag}/\text{Ag}_2\text{S}$ -modified CNT electrode, as shown in Figure (A). The  $\text{Ag}/\text{Ag}_2\text{S}$ -modified CNT electrode attained not only a wider linear concentration range for AA but also decreased the overlapping for AA and DA. The  $\text{Ag}/\text{Ag}_2\text{S}$ -modified CNT electrode can be used for simultaneous determination of AA and DA with a improved sensitivity of DA. Without  $\text{Ag}/\text{Ag}_2\text{S}$  modification, AA was not detectable. When  $\text{Ag}/\text{Ag}_2\text{S}$  nanoparticle was modified onto the CNT electrode, the sensitivity to AA became  $0.020 \mu\text{A}/\mu\text{M}$  in the linear concentration range of  $150 \mu\text{M} - 2000 \mu\text{M}$ , and the sensitivity to DA increased from  $0.637$  to  $1.000 \mu\text{A}/\mu\text{M}$ . The  $\text{Ag}/\text{Ag}_2\text{S}$  was successfully applied for analysis of AA and DA.

**Keywords:** Silver; Silver sulfide; Carbon nanotube; Biosensor; Dopamine; Ascorbic acid



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